Available online at www.sciencedirect.com

ScienceDirect

Procedia - Social and Behavioral Sciences 126 (2014) 172 – 173

Procedia
Social and Behavioral Sciences

ICTTP 2014

How closely related are time and space on the left-right axis?

Verena Eikmeier*, Rolf Ulrich

University of Tuebingen, Schleichstr. 4, Tuebingen, 72076, Germany

Abstract

Conceptual metaphor theory assumes that abstract concepts like time are represented by means of a concrete concept like space that can be experienced directly. Evidence for this assumption came initially from language research, which documented that almost all languages use spatial expressions to communicate temporal information (Haspelmath, 1997). Recent experimental research (e.g., Santiago et al., 2007; Ulrich & Maienborn, 2010) also showed that spatial concepts are activated when temporal linguistic information is processed. In these studies, participants judged the temporal content of a sentence or word. The speed of this judgment was influenced by the stimulus-response (S-R) mapping of the manual responses: participants responded faster to future-related information with the right hand than with the left hand and they responded faster to past-related information with the left hand than with the right hand. This space-time congruency effect suggests that we represent time in terms of a mental timeline that runs from left to right. Similar results were also obtained for the back-front axis (e.g., Torralbo, Santiago, & Lupiáñez, 2006; Ulrich et al., 2012) suggesting a second mental timeline that runs from back (past) to front (future).

In order to explain this space-time congruency effect it has been suggested that our mental representations of time and space overlap. We assessed the extent to which the representations of these two domains overlap on the back-front axis in a preceding study (Eikmeier et al., 2013) that draws on the predictions made by the dimensional overlap model (Kornblum, Hasbroucq, & Osman, 1990). According to this model, the size of a congruency effect depends on the extent of overlap between stimulus and response dimensions. The larger this overlap is, the larger is the congruency effect. In the experiments of our preceding study, S-R sets were either related to time or to space. The S-R congruency effect obtained for identical S-R sets (time-time or space-space) and different S-R sets (time-space or space-time) were of approximately the same size. Since the overlap is maximal for identical S-R sets, we concluded that the representations of time and space strongly overlap.

Although a space-time congruency effect has been documented for left-right axis as well, there is no evidence for a left-right mapping of past and future in natural language. Therefore it seems possible that the overlap of time and space on the left-right axis is weaker than the overlap on the back-front axis. To assess this hypothesis, we applied the above-described experimental logic to the left-right axis. In this experiment, participants vocally judged the temporal content of sentences referring to past or future. Reponses were either related to time (“past” or “future”; identical S-R sets) or to space (“in front” or “behind”; different

*Corresponding author. Tel.: +49-7071-29-76423; fax: +49-7071-29-2410.
E-mail address: verena.eikmeier@uni-tuebingen.de

Selection and peer-review under responsibility of the Organizing Committee of the International Conference on Timing and Time Perception.
doi:10.1016/j.sbspro.2014.02.360

S-R sets) and the S-R mapping was either congruent or incongruent. A larger S-R congruency effect was observed for the identical S-R set (time-time) than for the different S-R set (time-space). Compared with our earlier findings there was no difference between the identical and different S-R sets for the back-front axis, this result suggests a weaker overlap of time and space on the left-to-right than on the back-to-front axis.

Keywords: Space-time congruency effect; Dimensional overlap; Sentences; Conceptual metaphor; Mental timeline

References

Eikmeier, V., Schröter, H., Maienborn, C., Alex-Ruf, S., & Ulrich, R. (2013). Dimensional overlap between time and space. *Psychonomic Bulletin & Review, 20,* 1120-1125.

Haspelmath, M. (1997*). From space to time: Temporal adverbials in the world's languages.* Munich, Germany: Lincom Europa.

Kornblum, S., Hasbroucq, T., & Osman, A. (1990). Dimensional overlap: Cognitive basis for stimulus-response compatibility -- A model and taxonomy. *Psychological Review, 97,* 253-270.

Santiago, J., Lupiáñez, J., Pérez, E., & Funes, M. J. (2007). Time (also) flies from left to right. *Psychonomic Bulletin & Review, 14,* 512-516.

Torralbo, A., Santiago, J., & Lupiáñez, J. (2006). Flexible conceptual projection of time onto spatial frames of reference. *Cognitive Science, 30,* 745-757.

Ulrich, R., Eikmeier, V., de la Vega, I., Ruiz Fernández, S., Alex-Ruf, S. & Maienborn, C. (2012). With the past behind and the future ahead: Back-to-front representation of past and future sentences, *Memory & Cognition, 40,* 483-495.

Ulrich, R., & Maienborn, C. (2010). Left-right coding of past and future in language: The mental timeline during sentence processing. *Cognition, 117,* 126-138.